DOCUMENT RESUME

ED 470 178 IR 021 620

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TITLE	Issues in Integrating Computers into Classroom.
PUB DATE	2001-11-00
NOTE	6p.; In: Annual Proceedings of Selected Research and Development [and] Practice Papers Presented at the National Convention of the Association for Educational Communications and Technology (24th, Atlanta, GA, November 8-12, 2001). Volumes 1-2; see IR 021 504.
PUB TYPE	Reports - Evaluative (142) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	*Computer Uses in Education; Educational Practices; *Educational Technology; Elementary Secondary Education; Student Attitudes; Teacher Role; Teaching Methods; *Technology Integration
IDENTIFIERS	Technology Implementation; Technology Role

ABSTRACT

The technology adaptation is a very complex process. This process includes many different components or variables, such as quality of technology teacher training, quality of hardware and software, strategies and alternate ways of infusing software into lessons and effectiveness of class organization (District of Columbia, 1992). This paper discusses computers and computer-related issues in the classroom. The paper specifically focuses on the following issues: how technology/computers is integrated in the classroom; how it changes teachers' classroom practices; and what determines students' attitudes toward technology. Discussion includes the roles of computers in the classroom; teachers' level of computer use; planning the technology integration; technology, teacher and the classroom; and students' attitudes and anxiety towards computers. (Contains 21 references.) (Author/AEF)

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Issues In Integrating Computers Into Classroom

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Abstract

The technology adaptation is a very complex process. This process includes many different components or variables such as quality of technology teacher training, quality of hardware and software, strategies and alternative ways of infusing software into lessons and effectiveness of class organization (District of Columbia, 1992). In this paper, I will discuss computers and computer-related issues in the classroom. This paper specifically focuses on the following issues:

- *How technology/computers is integrated in the classroom*
- *How it changes teachers' classroom practices*
- *What determines students' attitudes toward technology*

Computer Integration

Computers have been in schools for a long time. While some teachers have integrated them into the curriculum successfully, some others have not used it at all. The following three issues can be considered important in integrating computers in the classroom: what roles do computers play in classroom? To what extent do teachers employ them to teach? And what are the specific procures and models followed to integrate computers in the classroom?

Roles of Computers in the Classroom

Computers have different roles and functions in the classroom. Seven major uses of computers in education have been discussed in the literature: drill-and-practice, tutorial, problem solving, simulation, inquiry, testing and programming. In the drill-and-practice, students are introduced new concepts and skills, and then computer gives practice in using them. A Spanish teacher, for example, may spend one lesson explaining the use of the imperfect tense, and for the next lesson may design a computerized practice in handling this tense.

In the tutorial, computer introduces and explains concepts and skills in which it gives practices. Similar to the programmed instructional text and teaching machines, the tutorial presents informational frames and also asks questions about them. In the problem solving, students are expected to solve problems posed by the computer. The computer structures the problems in a way that students identify the solution step by step and at the end of each successful step the computer provides scheduled rewards. Students' behaviors are shaped towards thinking about and tackling with problem solving.

In the simulation, students confront an environment that operates under certain rules. Their role is to act within this environment and then observe the results. For example, in a geography course, students can create their own trip across the Atlantic and make adjustments along the way accounting changes in wind and currents. Students also may use computers to retrieve information from diskettes, CDs, remote data sources to reach information from books and periodicals or the product of electronic publications that appear in no other form. The most common application of the computers' inquiry function would be searching the World Wide Web pages to gather data to solve a problem.

Computers are also ideal for presenting and scoring tests. They can automatically adjust the difficulty levels of test items based on students' responses so that students' performances are measured more precisely in less time. On the other hand, computers are able to improve students' learning performance by providing instant feedback based on students' answers. Computers are programmable tools. There are sets of instructions written one of several codes called programming languages. Although students need to know how to program to benefit from

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computer technology, gaining such a skill gives them greater control of the medium and opens opportunities for later employment.

Teachers' Level of Computer Use

It should not be expected from every teacher to use the technology at the same level because of the differences in their enthusiasm, knowledge and competencies. Hardy (1998) describes five different types of teachers using technology at different levels. The first type, enthusiastic beginners, prefers very basic computer applications to support their direct instruction. The second type, supported integrators, employs computers for the following purposes: enabling students to create their own products and helping them demonstrate their skills and ideas during the class. Supported integrators use varieties of computer programs and allow students explore those programs by themselves. High school naturals are concentrating on quantitative and analytic functions of computers and they mostly use computers' programming function. Unsupported achievers employ computers for remediation and they do not make much use of sophisticated applications. Finally, struggling aspires make very limited use of computers for their direct instruction.

Moersch (1995) describes seven levels of computer uses in the classroom. At the first level use teachers do not use any electronic technology. The technology they use is text-based, such as chalkboard and overhead projector. In the second level, teachers do not use computers directly in the classroom. Students use computers outside of class to perform some tasks, such as writing papers with word processors and creating data sheets with spreadsheet software. In this case, there is very little relevance to the teachers' instructional activities. The third level application is using computers as a supplementary tool. Tutorial, game or simulation programs are used to extent class activities or provide enrichment. In the infusion level, which is the fourth level, varieties of software programs are used, such as databases, graphing packages and multimedia applications in classroom. However, those applications are isolated from instructional events. For example, communication tools are used among people to only share data rather than actual teaching and learning. The forth level of use are more teaching and learning oriented. Computers are used for presenting information in a meaningful way to students so that students are put in a real-like environment for authentic learning. At the expansion stage, technology goes beyond classroom. Students use computers outside of class to perform lesson-related tasks. The final stage is refinement. In this stage, the problems are authentic. The computer is the major medium to search and process data for the problems and to bring the authentic solutions.

Planning the Integration

The use of computers in classroom should be carefully planned for successful implementations (Grangennet et al., 1997). The literature describes several systematic and non-systematic instructional planning models for teachers to create technology-integrated lessons.

Guide (1989) indicates that in a technology planning process teachers should first identify the content of a lesson, goals and objectives of the lesson, and learning activities with computers. Once those are identified, the lesson should be planned at four levels: Introduction, information presentation, guided practice and closure. In the introduction, students should be motivated through discussing the topic and relevant experiences, and posing attention-getting questions. During the introduction, the computer can be employed to present graphical data to initiate the discussion, record the points and interesting views elicited during the discussion. Also, computer printouts can be provided with students to make them ready for the following activities. In the information presentation, students are confronted the knowledge, skills and competencies to be learned. Usually, computers are used to present those skills to students directly or help students manipulate the new information. For instance, students may use a tutorial software program because these programs explain information to be learned step-by-step. Guided practice is structured to provide independent practice to reinforce students' newly learned skills and knowledge. For example, drill and practice software can be used after learners understand how to solve certain mathematical problems. In closure, teachers should summarize the lesson and mention how students may use their new skills to solve real life problems. Presentation or simulation software would be appropriate for this stage.

Another framework for technology integration is NTeQ (integrating technology for inquiry) that provides a guideline to create a computer-integrated educational environment through solving meaningful problems. According to NTeQ framework, to plan a lesson, the following steps should be taken: specifying objectives, matching the objectives to computer functions, specifying a problem, planning the data manipulation, planning the presenting of results, planning student activities and planning evaluation. At the first phase, specifying objectives, teachers are supposed to cover all the skills students need to gain during the lesson or unit. Then, teachers evaluate each

objective and match them with one or more functions of specific software programs. The functions are the tasks that software can do, such as calculation, drawing, matching and searching. After that, teachers create realistic problems. The problems are necessary because they will create an environment where students will generate critical thinking skills and gain necessary knowledge to reach the objectives. Also, teachers should consider how students would collect data related to the problems. They may identify a potential use of computers in data collection. Planning the data manipulation is related to how students will use the computers or what functions of computers they will employ to solve the problems. After students solve the problems with computers teachers should determine in what format students would present the results. Different presentation formats may help students see the results from different critical perspectives that would help make appropriate conclusion. The next step is planning student activities. Teachers should figure out what kind of activities would be better for students to solve the problems. The activities can either involve computer use or other classical applications, such as discussion and lecturing. The final stage is evaluation. Teachers should consider wide varieties of evaluation techniques, such as paper-and-pencil tests, a rubric and journal (Lowther & Morrison, 1998)

Sia (1992) says that, "when a teacher utilizes software to enhance instruction in a specific subject, he/she is putting software infusion into practice." The purpose of the software infusion is to achieve predetermined lesson objectives by incorporating appropriate computer programs. The followings should be considered in software infusion. Curriculum and software objectives should be aligned. Computer programs should be used wherever they may make contribution to the purpose of a lesson. Teachers should not intend to teach a whole lesson by a single software program. Rather, they should consider using wide range of software applications with their unique contributions to curriculum during a lesson. Teachers should not see technology integration very complicated and narrow their view about the utilization of the computer. For instance, besides using chalkboard, they may use a word-processing program to help students learn complex writing skills.

New technologies that can be used for educational purposes may require new planning and integration strategies. Internet is diffusing into education very quickly. Several internet-based lesson templates have been created for effective teaching. The WebQuest is a web-supported lesson template composed of five sections: Introduction, task, resources, evaluation and conclusion. The purpose of introduction is to orient learners about what they will learn and gain their attention. The task section describes what student will be doing during the lesson. The resources have a list of pre-selected web pages that have resources to help learners accomplish the task. However, when needed, students may use resources other than the provided web pages, such as books, tapes and face-to-face interaction. In the evaluation section, the teacher explains students how they will be evaluated on the task they have to accomplish. The final section, conclusion, summarizes the experience and generalizes what was learned.

Technology, Teacher and Classroom

Technology has changed the teachers' traditional role and expectations in the classroom. Hardley and Sheingold (1993) indicate that with technology, classrooms have been changed from a teacher-centered educational environment to a student-centered environment. Teachers see themselves as learning facilitators or tutor providing students with help when they encounter problems in the learning process rather than as an expert who performs direct teaching. Students work more actively on their own within small groups in a collaborative way (Schofield, 1995).

Berg et al. (1999) observed that exemplary computer-using teachers employ technology in their classrooms in a manner that are overwhelmingly constructivist. On the other hand, students use technology as a tool to explore new information and create new products. Because student groups work independently in classroom teachers generate more time to deal with students' individual problems and provide more learning materials for them so that they may be able to learn and think more. Moersch (1995) states that "As teachers advance from one step to another step [improves their technology use step-by-step] instructional focus shifts from being teacher centered to learner centered. The computer technology is employed as a tool that supports and extends students' understanding of pertinent concepts, processes and themes involved when using databases, telecommunication, multimedia, spreadsheets and graphing applications. Traditional verbal activities are gradually replaced by authentic hands-on inquiry related to a problem, issue or theme."

Student Attitude and Anxiety towards Computers

There are two important issues that may affect the success of technology infusion in classroom: students' attitude toward and anxiety about computers. Computer attitude can be defined as an evaluative disposition towards computers. On the other hand, computer anxiety is a fear or aversive behavior that occurs when students use

computers. Comp uter attitude and anxiety are among the major factors relating to students' success in learning (Lui & Johnson, 1998). Moreover, anxiety affects "the ability of individuals to use computers" (Anderson et al.,1984) and cause physical symptoms and discomfort (Ayersman, 1996). Due to their importance, the constructs of computer attitude and anxiety occupy a significant place in the literature (Lui & Johnson, 1998).

Two factors are considered important in computer attitude and anxiety: gender and experience. Investigating the relationship between gender and computer attitude, research studies revealed inconsistent results. Nelson and Cooper (1997) indicate that there is no significant attitudinal difference between boys and girls towards computers. However, girls use computer less than boys do and see themselves less skillful. Male students show better attitude toward computers than female students do. When programming is concerned there is a marked attitudinal difference toward computers between boys and girls in the favor of boys. Sacks et al. (1994) indicated that differences in findings may be due to instability in girls' attitude about computer across time. Also, another important finding is that boys provide unstable attribution to their failure but girls provide unstable attribution to their success.

Also, studies investigating the relationship between gender and anxiety revealed inconsistent results. McInernet et al. (1994) indicates that in using computer equipment and dealing with computer instructions males are less anxious then females and boys are more relaxed than. Chuna's et al. (1999) extended study revealed that female undergraduates are more anxious than male university undergraduates when they use the computer. In the contrary, the study by Anderson et al (1984) do not support the previous findings, which is that women in general exhibit higher levels of computer anxiety than man. Maurer (1994) took a different approach to the gender issue. Regardless of the gender, he described students with different identity as feminine, masculine, androgynous and undifferentiated. The results showed that feminine identity students had more computer anxiety than did masculine identity students regardless of gender.

Positive relationship has been found between computer experience and attitude- the more computer experience students have th. ~ ~her attitude they show toward the computer (Levine & Donita, 1998). It was also found that computer experience might diminish the attitudinal difference between males and females. After having had the experience, female students exhibit better attitude toward computers. However, Maurer (1994) advocates that there is a controversy in the literature about experience. Not always experience brings high attitude. He says that computer attitude is related to the types of computer experiences or computer education students have .On the other hand, Ayersman (1996) indicates that any positive computer experience may reduce the computer anxiety, including workshops, classes, hands-on experiences and training. Even having experience with a privately owned computer at home improves students' attitude.

In addition to experience and gender, other variables are affective on computer attitude and anxiety. In science and math related areas, students experience attitude and anxiety-related problems (Sacks et al., 1994). Teacher attitude also affects student attitude in the classroom. (Dupagne & Krendl, 1992). If students are in a self-directed learning environment which is free of evaluation and assessment they have better attitude and show less anxiety toward computer than the otherwise (McInernet, 1994). Finally, access to computer determines students' attitude toward computers (Lui & Johnson, 1998). "Studies have showed that females are less likely to use computers if they have to compete for use time" (Sacks et al., 1994).

References

Anderson, R. E., Welch, W. W. & Harris, L. J. (1984). Inequities in opportunities for computer literacy. *The computing teacher*, 11(8), 10-12

Ayersman, D. J. (1996). Effects of computer instruction, learning style, gender, and experience on computer anxiety. *Computers in the Schools*, 12(4), 15-30

Berg, S. et al. (1999). Exemplary technology use in elementary classrooms. *Journal of Research on Computing in Education*, 31(2), 111-122

Building Blocks of a WebQuest (---). Available online http://edweb.sdsu.edu/people/bdodge/webquest/buildingblocks.html

Chuna, S. Et al. (1999) Computer anxiety and its correlates. A meta-analysis. *Computer in Human Behavior*, 15, 609-623

District of Columbia (1992). Learning technologies essential for educational change. (ERIC Document Reproduction Service ED349967)

Dupagne, M. & Krendl, K. A. (1992). Teachers' attitude toward computers: A review of the literature. *Journal of Research on Computing in Education*, 24(3), 420-429

Grandgenett, et al. (1997). Integrating technology into teaching and learning: The tree keys to the kingdom. *ISTI*, 34, 252-257

Hadley, M., & Sheingold, K. (1993). Commonalities and distinctive patterns in teachers' integration of computers. *American Journal of Education*, 101, 261-

Hardy, J. V. (1998). Teacher attitudes toward and knowledge of computer technology. *Computers in the Schools*, 14(3/4), 119-136

Levine, T., & Donita, S. (1998). Computer use, confidence, attitudes, and knowledge. *Computers in Human Behavior*, 14(1), 125-147

Lowther, D. L., & Morrison, G. R. (1998). The NTeQ model. A framework for technology integration. *Techtrends*, (March, 1998), p.33-38

Lui, L. & Johnson, D. L. (1998). A computer achievement model: Computer attitude and computer achievement. *Computer in the Schools*, 14(3/4), 33-53

McInernet, et al. (1994) Student teachers' computer anxiety and computer experience. *Journal of Educational Computing Research*, 11(1), 27-50

Moersch, C. (1995). Levels of technology implementation: A framework for measuring classroom technology use. Learning and Leading with Technology, 23(3), p.40-42

Nelson, L. J., & Cooper, J. (1997). Gender differences in children's reaction to success and failure with computer. *Computer in Human Behavior*, 13(2), 247-267

Polin, L. (1992). (Making) Changes in teachers' understanding and use of technology for instruction. (ERIC Document Reproduction Service ED349958)

Sacks, C. H. et all (1994) Attitudes toward computers and computer use: The issue of gender. *Journal of Research on Computing in Education*, 26(2), 256-269

Schofield, J. W. (1995) Computers and classroom culture. Cambridge University Press: New York.

Sia, A. P. (1992) Enhancing instruction through software infusion. (ERIC Document Reproduction Service ED363605)

Technology Use Guide (1989) Planning computer lessons. (ERIC Document Reproduction Service ED339258)

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